REMARKS

Applicants respectfully request entry of the subject Preliminary Amendment.

The specification and claims 18 and 20-22 have been amended to correct typographical errors. No new matter has been added.

FIG. 1 has been amended to correct a typographical error and to add "TMC" to block 34 as indicated with red lined drawings submitted for approval. In particular reference character "20n" has been changed to "20b" and the traffic management center (TMC) block 34 has been labeled "TMC" for clarity. Formal drawings will be supplied after the approval of this correction. No new matter has been added.

Claims 18, and 20-22 have been amended to correct typographical errors. No new matter has been added.

In accordance with 37 C.F.R. §1.121(c), a marked up version of the claims being changed by the current amendment is attached hereto.

Another version of the changed paragraphs of the Specification, on a page separate from the amendment, marked up to show all changes relative to the previous version of the changed paragraphs of the Specification, is enclosed.

Consideration and examination of Claims 1-36 is respectfully requested.

The Examiner is respectfully invited to telephone the undersigning attorney if there any questions regarding this Amendment or this application. The Assistant Commissioner is hereby authorized to charge payment of any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0845.

Respectfully submitted,
Daly, Crowley & Mofford, LLP

Dated: 9/17/02

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Attachments: 4 Sheets of the Specification and Claims with markings showing changes made, red-lined corrected version of FIG. 1.

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Version of Specification and Claims with Markings to Show Changes Made

IN THE SPECIFICATION

Paragraphs Replaced:

Paragraph on Page 2, beginning at Line 20 and ending at Line 27 with:

In order to detect incidents anywhere on the road within, for example five minutes, sensor spacing cannot exceed the size of the queue that develops five minutes after an incident. If the sensors were widely spaced, a conventional algorithm might not detect a queue build up for several minutes because the sensor might be located at a distance, equal to traveling five minutes at an average speed, before the occurrence of an incident. Where the traffic flow is light, an incident would only cause the formation of a short queue of vehicles. A conventional system would require sensors to be spaced less than 500 meters apart to detect the short queue within five minutes.

Paragraph on Page 8, beginning at Line 4 and ending at Line 22 with:

The roadside equipment, TPR's ~~16~~20 and TG's 24, process each transponder's 16 data to determine the following information: (i) an indication with high confidence that the indicated transponder 16 crossed the detection location in the expected direction of travel; (ii) the date and time of detection in Universal coordinated time (UTC); (iii) the difference in time from previous detection to current detection; (iv) the location of previous detection (this information is stored in the transponder 16 memory); (v) the registered vehicle classification; (vi) the instantaneous vehicle speed collected at Toll Gateways 24 only; and (vii) an estimate of vehicle occupancy over the full-width of the roadway which is collected at Toll Gateways 24 only and typically detected by induction loop sensors. It should be noted that the system preferably operates using universal coordinated time (UTC) that is referenced to a single time zone. Preferably, the link or

segment travel time, which is the difference in time between the time of a vehicle detections at the start and end of a segment 11, is accurate to within ± one second. Additionally, Toll Gateways 24 can determine the count, speed, and occupancy of non-AVI vehicles which can be extrapolated to augment the AVI data produced by TPR's 20. It should be appreciated that the incident detection system 100 can be used with an open-road automatic vehicle identification tolling instead of traditional toll booths, and that the incident detection system 100 is not limited to any specific toll collection method or roadway configuration.

Paragraph on Page 10, beginning at Line 8 and ending at Line 16 with:

In steps 44-48, an expected speed and expected travel time for the next segment 11 of the roadway are calculated for the vehicle 12 that has been detected. In step 44, the expected speed for each identified vehicle ~~14~~12 is calculated. For each vehicle V_i entering a road segment 11 denoted S_j starting Toll Gateway 24, a start speed is given by:

$StartSpeed[V_i,S_j]$~~$[V_j,S_j]$~~ = instantaneous speed of V_i at the start of S_j;

Where:

S_j denotes the segment 11 starting with Toll Gateway 24; and

V_i denotes a vehicle 12 identified by Toll Gateway's 24 AVI reader 22.

The Toll Gateway 24 can measure the speed of a vehicle as it passes without stopping.

Paragraph on Page 10, beginning at Line 18 and ending at Line 23 with:

For each vehicle 12 denoted V_i entering a road segment 11 denoted S_j that starts with a TPR 20 the starting speed for the segment 11 is determined from the average speed over the prior segment since a TPR 20 can not measure instantaneous speed, and is

calculated by :

StartSpeed[V_i,S_j]~~[V_j,S_j]~~ = average speed of V_i over prior segment from S_{j-1} to S_j, computed from the length of segment S_{j-1} divided by the time to complete the segment..

CLAIMS

18. The method of claim 6, wherein the expected time for each of the plurality of vehicles to be detected by reader is calculated by:

$$ExpSpeed[V_i, S_j] = \min(StartSpeed[V_i, S_j], HighSpeed[S_j])$$

$$ExpTime[V_i, S_j] = \frac{Length[S_j]}{ExpSpeed[V_i, S_j]}$$

where,

V_i is a vehicle entering a road segment S_j;

ExpTime~~[V_j,S_j]~~[V_i,S_j] = expected time for V_i to be detected;

StartSpeed~~[Vj,Sj]~~ [V_i,S_j] = starting speed of V_i at the beginning of segment S_j;

ExpSpeed[V_i,S_j] = expected speed over segment S_j;

HighSpeed [S_j] = average legal speed limit over the segment starting at S_j; and

Length [S_j] = length of the segment starting at S_j.

20. The method of claim 18, wherein a difference between the expected and actual

link travel time for each of the plurality of vehicles is calculated by:

$$Diff[V_i, S_j] = \frac{\max\left(ActualTime[V_i, S_j], \frac{Length[S_j]}{HighSpeed[S_j]}\right) - ExpTime[V_i, S_j]}{ExpTime[V_i, S_j]} \times 100\%;$$

where:

ActualTime~~[Vj,Sj]~~ [V_iS_j] = actual time for V_i to travel over segment S_j.

21. The method of claim 18, wherein the starting speed of V_i is calculated by:

StartSpeed~~[Vj,Sj]~~ [V_iS_j] = average speed of V_i over a prior segment.

22. The method of claim 18, wherein the starting speed of Vi is calculated by:

StartSpeed~~[Vj,Sj]~~ [ViSj] = instantaneous speed of Vi at the start of Sj measured by a toll gateway speed sensor.